

**RESPONSE TO OFFICE ACTION**

This paper is submitted in response to the Office Action mailed on March 12, 2003, for the referenced case ("the Office Action"). Claim 2 has been canceled, claim 8 has been added, and claims 1 and 7 have been amended. Hence, claims 1 and 3-8 are currently pending. Reconsideration of the present application is respectfully requested in light of the foregoing amendments and the following remarks.

***Divisional Application***

Section 1 of the Office Action notes "This application appears to be a division of Application No. 09/176,011...." Applicants agree with this statement, as the first sentence of the application states, "This application is a division of U.S. Patent Application No. 09/176,011, now U.S. Patent No. 6,330,825, which claims the benefit of U.S. Provisional Patent Application No. 60/063,183, filed October 20, 1997."

***Claim Rejections – 35 USC § 102***

Sections 3-4 of the Office Action rejected claim 1 under 35 U.S.C. 102(b) as allegedly being anticipated by U.S. Patent No. 5,343,848 to Birch et al. ("Birch"). Claim 1 has been amended to incorporate the subject matter of claim 2, making the rejection of claim 1 under section 102 moot.

***Claim Rejections – 35 USC § 103***

Sections 5-6 of the Office Action rejected claims 2-7 under 35 USC 103(a) as allegedly being unpatentable over Birch in view of U.S. Patent No. 5,119,886 to Fletcher et al. ("Fletcher"). Applicants respectfully traverse these rejections.

Birch discloses a device for converting liquid fuel into converted fuel having a smaller proportion of vapor and a larger proportion of microscopic fuel droplets. See Birch at Abstract. Fletcher is directed to a heat transfer apparatus for a rotating heated cylinder for producing or processing materials or work pieces. See Fletcher at col. 1, ll. 6-9.

First, MPEP 2143.01 states that there must be some motivation to combine references to make an obviousness rejection. The disclosures of Birch and Fletcher both mention cylinders and heaters, but there is no reason for one skilled in the art to combine the teachings of Fletcher with Birch to achieve the claimed thermal reactor for converting a liquid hydrocarbon fuel to a fuel vapor. Figure 1 of Fletcher illustrates an application of the heat transfer cylinder shown therein. Sheets of materials (paper 6 and felt 7) pass over cylinder dryers 3 in which the disclosed heat transfer cylinders 12 are employed. The purpose of the heat transfer cylinders is to provide uniform heat to the *outer* wall 38 over which the process material passes.

There is no mention of using the cylinder to heat fuel, or any other substance flowing *through* the cylinder. There is no teaching of an inlet or an outlet for any type of fuel or other process to be heated by flowing through the cylinder. As Fletcher is only directed to heating materials passing over the outer wall 38 of the cylinder, there would be no reason for one skilled in the art to apply the disclosed heating system to a device for heating fluid flowing into a cylinder.

MPEP 2143.01 further notes, "If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the

teachings of the references are not sufficient to render the claims *prima facie* obvious." In *In re Ratti*, the CCPA held that claims were not *prima facie* obvious because the "suggested combination of references would require a substantial reconstruction and redesign of the elements shown in [the primary reference]." 270 F.2d 813, 123 USPQ 349, 352 (CCPA 1959).

There is no mention of using the cylinder disclosed in Fletcher to heat fuel, or any other substance flowing *through* the cylinder. In fact, with the device shown in Fletcher, fuel could not flow through the cylinder to be heated – the disclosure of Fletcher clearly says that the cylinder is closed. The cylinder may be hollow, in which case it contains insulation 39, or it may be solid. In either case, it would not be possible for fluid to flow through the cylinder to be heated. Moreover, the vacuum chamber 22 of Birch has a rotor 34 situated therein, that "makes contact with the housing wall 16 along line C. In one form of the invention, the spacing along line C is approximately one-thousandth of an inch." Birch at col. 6, ll. 24-26. Thus, the rotor occupies virtually the entire space inside the chamber 22. This would not be possible with the insulation-filled or solid cylinder of Fletcher.

There is no mention or suggestion of flowing anything *through* the cylinder of Fletcher to be heated, and doing so would completely change the principal of operation of the device shown therein.

Additionally, MPEP 2143.03 notes that to establish a *prima facie* case of obviousness, all claim limitations must be taught or suggested by the prior art (citing *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)). Even if it made sense to combine the disclosures of Birch and Fletcher as suggested in the office action, this combination of references fails to teach or suggest all of the recited claim limitations.

For example, claim 1 includes "a plurality of heating elements disposed in the cylinder, the heating elements arranged such that the liquid hydrocarbon fuel contacts the heating elements...." The combination of Birch and Fletcher fails to teach or suggest this limitation. Birch actually teaches away from this concept. Birch discloses "heating coils 40 around each fuel injector...." Birch at col. 6, ll. 31-32. Hence, the heating coils 40 are not *disposed in the cylinder*. Birch goes on to state that "heating coils (not shown) could be provided in the walls or ends of the vacuum chamber 22." Col. 6, ll. 33-35. If heating coils are placed in the walls or ends of the vacuum chamber, the liquid fuel would not contact these heating coils as recited in claim 1. Because of the close positioning of the rotor 34 to the inside of the chamber 22, it does not appear that heating elements could be positioned such that fuel flowing into the chamber 22 could contact the heating elements.

If it were somehow possible to apply the heat pipes 10 of Fletcher to the chamber 22 of Birch in the manner taught by the disclosure of Fletcher, the heat pipe would still would not be situated such that any heating elements contact the fuel to be heated. As noted in Fletcher, the cylinder may be hollow or solid. If it is solid, of course fuel cannot flow through the cylinder to be heated. If the cylinder is hollow as in Figure 5 of Fletcher, the heat pipes 10 are still disposed completely within the cylinder wall 30, between the inner and outer walls 36, 38. In the embodiment shown in Fletcher, even if the cylinder were drastically modified such that fuel could flow into the interior of the cylinder, the fuel would not be heated because the insulation 39 would *prevent* the transfer of heat from the heat pipe 10 to the fuel.

Applicants therefore respectfully submit that the combination of Birch and Fletcher fails to teach or suggest each claimed element. Claim 1, and the claims dependent thereon, are thus believed to be proper for allowance.

Claim 7 has been rewritten in independent form, and includes

"at least one fuel bar connected to a side wall of the cylinder, the fuel bar defining at least one fuel well in fluid communication with the axial bore of the cylinder, the fuel well defining the inlet port such that the liquid fuel flows into the fuel well"

The office action states "the heating elements 40 are capable of being disposed in the walls of chamber 22...." However, col. 6, ll. 33-35 of Birch cited in support of this assertion does not suggest that the heating coil 40 situated around the fuel injector 28 for *preheating* the fuel before entering the cylinder could be repositioned in the walls of the chamber. Actually, lines 33-35 state "heating coils (not shown) could be provided in the walls or ends of vacuum chamber 22 to *reheat* the fuel." (Emphasis added). As these heating coils would be used to *reheat* the fuel after it was previously heated by the coils 40, it is clear that additional coils are contemplated – not moving the fuel injector 28 and associated coil 40 to a side wall position.

In any event, this cited passage of Birch, as well as the remaining disclosure of Birch, fails to teach or suggest a fuel bar connected to a side wall of the cylinder defining a fuel well in fluid communication with the cylinder bore. Even if additional heating coils are positioned *in the walls* of the Birch device, these heating coils would not be in fluid communication with the cylinder interior.

Additionally, any fuel coils situated in the walls of the cylinder certainly would not define the cylinder inlet port. Again, Birch teaches away from this concept. Birch very explicitly describes the position of the fuel injector 28:

"The injectors 28 lie on the upstream side of a plane D formed by axis A and line C and as near to line C as is possible and still inject the fuel. The reason for this is so the fuel remains in the vacuum chamber as long as possible to more greatly facilitate the formation of converted fuel."

Birch at col. 6, ll. 35-38. As can be seen in Figure 5 of Birch, meeting these stated criteria for positioning the injectors would not allow placement of the injectors (inlet) in a fuel well connected to the side wall of the cylinder.

Therefore, the combination of Birch and Fletcher fails to teach or suggest each limitation of claim 7.

#### *New claims*

New claim 8 has been added herein. No new matter is introduced via claim 8. Claim 8 simply recites the thermal reactor in "means plus function" format as allowed by 35 USC 112, paragraph 6. The claim thus covers the structure described in the specification for accomplishing the claimed function. *In re Donaldson Co.*, 16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994).

As noted in detail above, Birch and Fletcher, alone or in combination, fail to disclose or suggest the structure described in the present specification for heating liquid fuel. Thus, Applicants respectfully submit that new claim 8 is proper for allowance.

#### *Conclusion*

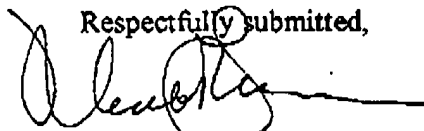
As evidenced by the foregoing amendments and remarks, Applicants have made a genuine effort to respond to each issue raised in the Office Action. The Examiner is invited to contact the undersigned attorney at 952.474.3701 with any questions, comments or suggestions relating to the referenced patent application.

#### **REQUEST FOR TIME EXTENSION**

Pursuant to 37 C.F.R. § 1.136(a), Applicant petitions for an extension of time of three months in which to respond to the Office Action dated March 12, 2003. Pursuant to 37 C.F.R. §

1.17, the Commissioner is authorized to deduct the three-month time extension fee of \$465 (small entity) from Howrey Simon Arnold & White, LLP Deposit Account No. 01-2508/10422.0002.DVUS01. Should any additional fees under 37 C.F.R. §§ 1.16 to 1.21 be required for any reason relating to the enclosed materials the Commissioner is authorized to deduct such fees from said deposit account.

Respectfully submitted,



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